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Original Article

Illness perception and cardiovascular health behaviour among persons with ischemic heart disease in Indonesia

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ABSTRACT

Objective: A study was conducted to explore the level of illness perception, the level of cardiovascular health behaviour and the relationship between illness perception and cardiovascular health behaviour among persons with ischemic heart disease (IHD) in a community setting.
Method: The participants comprised 235 persons with IHD. The instruments used were as follows: 1) Demographic Data and Health Information, 2) The Brief Illness Perception Questionnaire (Brief IPQ), 3) The Open-ended Questionnaire (OEQ), and 4) The Modified Cardiac Health Behaviour Scale (MCHBS). Findings from the OEQ are used to assess in-depth illness perception and to extend the information obtained from the Brief IPQ. The design of the study was descriptive correlational. The data were analysed using descriptive statistics to present the demographic data and health information. Inferential statistics was used to resolve the relationship between illness perception and cardiovascular health behaviour by using Pearson's Product Moment Correlation.
Result: The mean score of illness perception was at a moderate level ($M = 43.65$, $SD = 3.93$), whereas the mean score of cardiovascular health behaviour was at a high level ($M = 80.29$, $SD = 5.42$). A significant positive relationship existed between illness perception and cardiovascular health behaviour among persons with IHD ($r = 0.38$, $P < 0.01$).
Conclusion: Persons with higher illness perception showed a positive correlation with higher cardiovascular health behaviour at a significant level of 0.01. Results provided important information for nurses to develop an intervention program to promoting appropriate illness perception and cardiovascular health behaviour among persons with IHD.

1. Introduction

Ischemic heart disease (IHD) is the leading cause of death. IHD is a heart problem caused by reduced blood supply to the heart, and thus less oxygen reaches the heart muscle. The World Health Organization (WHO) reported that 17.5 million people died from cardiovascular disease in 2012 worldwide and, 7.4 million of these deaths are due to IHD [1]. The prevalence of IHD has increased each year. According to Riskesdas [2], the prevalence of IHD in Indonesia was increased from 0.5% (in 2007) to 1.5% (in 2013). In Bondowoso, a city in East Java Province, Indonesia, the prevalence of IHD was 235 people in 2012; this number increased to 558 people in 2013, the highest in Indonesia [3].

People with IHD still behave in the manner they did before their diagnosis. A diagnosis of IHD has a great impact on the health of a person such as the productivity of one's life, as well as on families, and societies [4] but they did not care about that and still continue smoking, uncontrolled blood pressure, unhealthy diet and physical inactivity. Persons need to respond effectively to a diagnosis of IHD and employ both cognitive and behavioural strategies [4]. Schroeder [5] stated that more than 60% of IHD risk factors are preventable and modifiable by performing healthy behaviuor.

Changing a person's behaviuor is important to reduce IHD risk factors and improve the cardiovascular health of a person. Studies about cardiovascular health behaviour to reduce the impact of cardiovascular disease have been conducted in Western countries [8] and Asian countries [9]. Modifiable risk factors particularly smoking cessation, checking blood pressure levels, diet management, physical activity, and stress management [7] could control the risk of IHD [6].

Earlier studies on the factors related to cardiovascular health behaviour have also been conducted in Nepal [10] and America [11].

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Behaviour is associated with illness perception. Illness perception emerges as a result of our beliefs about illness and what illness means in the context of our lives. A person might have her/his own thoughts about how an illness is caused, how long it will last, how it will affect her/his life, and how it can be controlled or cured [12]. Thus, illness perception promoting-program significantly improved behaviour in patients with end-stage renal disease who were received hemodialysis [13] and had significant relationship with healthy behaviour in patients with CHD [15]. Previous studies had attempted to explore the relationship between illness perception and behaviour. The perception or the formation of a perception results from information inherent in a culture [14]. However in Indonesia, no study has been conducted on this topic. A different culture might present a different perception of illness which may be the case in Indonesia due to lack of the state of knowledge. Furthermore, previous studies had revealed that patients' illness perceptions influence their thoughts and health behaviour [16].

Previous studies have explored illness perception. However, all of these studies did not specifically focus on the relationship between illness perception and cardiovascular health behaviour. Furthermore, these studies are conducted in a clinical setting, whereas there are many more persons with IHD in the community [17] and there is a need to assess these persons illness perception. Broadbent [16] explained that illness perception could be linked to behaviour, specifically cardiovascular health behaviour. Illness perception among persons with IHD is influenced by various factors, including race, faith, and preclinical illness quality of life, rather than clinical measures [18]. The findings of these previous studies might not be applicable to persons with different cultural backgrounds, especially in the Muslim context.

The Western and the Eastern health cultures are the two kinds of general cultural backgrounds in the world [19]. Western culture has high technology and a high level of awareness of health, while the Eastern culture has traditional Asian health treatments and healing practices [20]. Indonesia is one of the Asian countries with a unique culture in terms of health behaviour because of differences geographical and cultural aspects. For example, the people in Central Java consume more salty and fatty foods. Whereas those in West Java, eat more vegetables [21]. Furthermore, in the mountainous areas, 80% of people tend to smoke, and in the coastal areas people often drink alcohol and have low levels of physical activity [2]. Thus, different backgrounds can influence a person's illness perception [22], which leads to future health behaviour [23].

Therefore, in this study the researcher explored the relationship between illness perception and cardiovascular health behaviour among persons with IHD. The result of this study could be used to promote secondary prevention for IHD and baseline knowledge for health care provider to increase person's awareness of performing daily cardiovascular health behaviour, such as smoking cessation, controlling blood pressure, diet management, stress management, and taking medications to control the risk of IHD.

2. Objectives of the study

The following are the objectives of this study:

2.1 To examine the level of illness perception among persons with IHD
2.2 To examine the level of cardiovascular health behaviour among persons with IHD
2.3 To explore the relationship between illness perception and cardiovascular health behaviour among persons with IHD

3. Methods

3.1. Design

This descriptive correlational study is conducted to explore the relationship between illness perception and cardiovascular health behaviour among persons with IHD.

The Common Sense Model (CSM) of illness perception proposed by Leventhal, Nerenz and Steele [24] was used as a conceptual framework for this study. The CSM explains the way a person makes sense of her/his illness which influences her/his behaviour. This model is used to explain the link between illness perception by forming a cognitive representation of the threat and cardiovascular health behaviour, which guides the coping strategy. This study focused on both cognitive representation and emotional representation, which lead to coping and the modification of modifiable risk factors of persons with IHD in relation to cardiovascular health behaviour so that the disease can be controlled.

3.2. Instrumentation

The instrumentation is composed of four parts. They are as follows:

3.2.1. Demographic data and health information

The demographic data and health information were used to assess age, gender, religion, marital status, education status, smoking, weight, physical activity, cholesterol levels and blood pressure levels obtained by asking questions. Health information was obtained from records from the public health centre. Demographic data and health information for all questions consisted of 10 items, 4 items for demographic data and 6 for health information.

3.2.2. The Brief Illness Perception Questionnaire (brief IPQ)

The Brief Illness Perception Questionnaire (Brief IPQ) was developed by Broadbent et al., in 2006. The Brief IPQ consisted of 9 items. Each item of the Brief IPQ assesses one dimension of illness perception, namely consequences, timeline, personal control, treatment control, identity, coherence, emotional representation, concern, and causes.

Items 1 to 8 were measured in a continuous scale ranging from 0 (less threatening view of the illness) to 10 (high threatening view of the illness). The details of each item were as follows: Item 1 measured the Consequences (no effect at all to severely affect a person's life). Item 2 measured timeline (a very short time to forever). Item 3 measured Personal Control (absolutely no control to extreme amount of control). Item 4 measured Treatment control (not at all to extremely helpful). Item 5 measured Identity (no symptom at all to many severe symptoms). Item 6 measured Concern (not at all concerned to extremely concerned). Item 7 measured Coherence (do not understand at all to understand very clearly). Item 8 measured Emotion (not at all affected emotionally to extremely affect emotionally). Item 9 was an open-ended response item to capture causes, by asking the participants to list three most important causes of their illness.

The scores from items 1 to 8 were analysed and interpreted as mentioned above, in order to understand the dimensions of illness perception as described originally. The total illness perception scores were computed by summing up the scores from items 1 to 8, with reverse scores of the items 3, 4, and 7. The possible scores ranged from 0 to 80, with higher scores indicating more threatening perception of the illness. For further interpretation of the Brief IPQ, the scores were divided into three groups: scores 0–27 indicated low level of threatening illness perception, scores 28–55

indicated moderate level of threatening illness perception, scores 56–80 were indicating high level of threatening illness perception. Responses from item 9 were analysed by grouping the causes and descriptive statistics.

3.2.3. The Open-Ended Questionnaire (OEQ) developed by the researcher

The open-ended questions developed by the researcher, consisted of eight questions related to the patient's beliefs about health and illness. The questions were constructed based on the eight dimensions of the CSM. The questions are the following: (a) What is the sign or symptom that you have and think is related to your illness? (b) How long do you think your illness will last? (c) What do you think about your illness? (d) What are the consequences of your illness? (e) What is/are the cause(s) of your illness? (f) Do you think that you have control over your illness?

(g) How do you feel about your illness? (h) Do you think that cardiovascular health behaviour can help your condition? (Coherence).

The purposes of using the OEQ awere as follows: 1) to capture and assess whether the person's representation would be positive, benign or threatening and 2) to assess in-depth illness perception and to extend the information obtained from the Brief IPQ. The researcher interviewed 30 cases. The result of the OEQ was analysed using the content analysis for summarising main essence.

3.2.4. The cardiac health behaviour scale modified from the cardiac health behaviour scale (CHB) [25]

The cardiac health behaviour scale was developed by Oh (2013) and modified by the researcher. The modified CHBS covered the dimensions of (1) physical activity, (2) stress management, (3) diet management, (4) smoking cessation, (5) blood pressure control and (6) taking medications. Three items were included in this study as they measured taking medications. Three items were excluded in this study as they measured heart responsibility, which was not the focus of this study. The questionnaire consisted of 25 items; it used a 4-point response (1 = never, 2 = sometimes, 3 = often and 4 = routinely), detailed as follows.

Never: A person never performed the behaviour
Sometimes: A person performed the behaviour 1–3 days per week
Often: A person performed the behaviour 4–6 days per week
Routinely: A person performed the behaviour every day

The scores were then computed by summing up scores from the items. Possible scores ranged from 25 to 100. A higher score represented a better performance of cardiovascular health behaviour. Furthermore, the MCHBS scores were divided into three groups: scores 25–50 are indicated the low performance of cardiovascular health behaviour; scores 51–75 indicated the moderate performance of cardiovascular health behaviour, and scores 76–100 indicated the high performance of cardiovascular health behaviour.

3.3. Validity and reliability of the instruments

The content validity of the instruments was validated by a panel of three experts; an advanced practice nurse (APN) in cardiovascular care at Prince of Songkla University, a nurse expert in cardiovascular care at Songklanagarind Hospital and a cardiologist from Indonesia. For reliability, the Bahasa version of the questionnaires was tested with 20 persons who have the same characteristics as the participants in the actual study, and who stay in the same community. The test-retest reliability was tested for the stability of the Brief IPQ over time. The retest was conducted 2 days after the first test, yielding a correlation coefficient of 0.91. Regarding the CHB, the internal consistency reliability was examined, yielding Cronbach's alpha coefficient of 0.92.

3.4. Participants

The participants of this study were persons who met the following inclusion criteria: aged of 19 years or older person who can make decisions in her/his life or older, able to communicate in the Indonesian language and persons who have been diagnosed with IHD, Total sampling is used from all the target population ($n = 235$).

3.5. Ethical consideration

The permission for data collection is obtained from the Faculty of Nursing, Prince of Songkla University, Thailand. A permission from the Department of Health and the Head of Public Health Care in East Java Indonesia is also obtained.

3.6. Data collection procedures

The data collection procedures are as follows: After obtaining approval, the data collection is conducted from January 2016 to March 2016. Firstly, a brief explanation about the study objectives, types of instruments and the methods of the data collection to the respondent of the selected departments are given. Three departments that related to the respondents among others are included: the emergency department, policlinic department and ward department. Then, a list of the names of the persons with IHD from 2014 to 2015 is obtained from the departments. Finally, invitation letter and consent form are distributed to the selected subjects for seeking their willingness to participate in the study. The identities of the subjects are kept anonymous by using codes instead of their names to ensure confidentiality and anonymity. The researcher ensures that they could withdraw from the study at any time, if they wanted to.

After the names of the subjects are received, the researcher coordinates with the nurses in nine villages to check the data, and after checking all the data, the researcher distributes the instruments to all subjects. The researcher and research assistant collects data from 235 cases. After, data collection, the researcher processes and computes all of the data.

3.7. Data analysis

Descriptive and inferential statistics are employed to answer the research questions and research hypothesis. The following statistical procedures are used to analyse the data.

3.7.1 Before the analysis, the data are cleaned to detect and correct any error in the data set.
3.7.2 Descriptive statistics consisting of mean, standard deviation, frequency, percentage, range, and minimum and maximum values are used to present the demographic data and health information of the study persons with IHD.
3.7.3 Illness perception and cardiovascular health behaviour are analysed using the descriptive statistics.
3.7.4 The assumptions underlying bivariate analysis for the descriptive correlational study are tested. The assumptions of the correlation are (1) normality, (2) linearity, and (3) homoscedasticity.
3.7.5 The relationship between illness perception and cardiovascular health behaviour was explored using the Pearson's Product Moment Correlation.

3.7.6 The content analysis method is used to analyse the data from the Open-Ended Questionnaire.

4. Results

The participants of the study are the persons with IHD from the community area of the public health center. The study include a total of 235 persons with IHD as participants. Most of the participants are persons in the age group of 61–70 years old. More males (73.62%) were included than females (26.38%) and Most of the persons with IHD in this study have duration of illness of 0–1 year and 2–3 years (49.37%), and hypertension is a main comorbidity (61.27%).

Tables 1 and 2 indicates the demographic data and health information to assess age, gender, religion, marital status, education status, smoking, weight, physical activity, cholesterol and blood pressure levels and consists of 11 items to identify a person's behaviors related to IHD.

The mean of total illness perception score was at a moderate level ($M = 43.65$, $SD = 3.93$) indicating persons' moderate level of threatening illness perception (Table 3) and Regarding the causal dimension, the most perceived cause of IHD was smoking (47.66%). The main result from the OEQ, drawn from the 30 cases showed eight categories of illness perception of persons (Table 4).

Level of cardiovascular health behaviour was explored. The participants reported a high level of performing cardiovascular health behaviour ($M = 80.29$, $SD = 5.42$) (Table 5). A significant positive relationship existed between illness perception and cardiovascular health behaviour of persons with IHD ($r = 0.38$, $P < 0.01$), indicating higher threatening perception of the illness and better cardiovascular health behaviour (Table 6).

5. Discussion

This section presents the discussion of the findings corresponding to the research objectives and hypothesis. The objectives of this study were to explore the level of illness perception and cardiovascular health behaviour among persons with IHD, as well as to explore the relationship between illness perception and cardiovascular health behaviour.

Table 1
Frequency, percentage, minimum, maximum, mean, and standard deviation of Samples based on the demographic data ($n = 235$).

Characteristic	*n*	%
Age(*Min-Max*=50–85)		
50–60 years old	78	33.19
61–70 years old	103	43.83
71–80 years old	49	20.85
>80years old	5	2.13
Gender		
Male	173	73.62
Female	62	26.38
Religion		
Muslim	235	100
Marital status		
Married	196	83.40
Widow/Widower	39	16.60
Educational level		
Non-formal education	57	24.25
Elementary school	48	20.43
Junior high school	87	37.02
Senior high school	16	6.82
Diploma	27	11.48

Note: WHO classified elderly in to four groups.
Min, mean, max, and SD to be construed as nonparametric explanation.

Table 2
Frequency, percentage, minimum, maximum, mean, and standard deviation of the samples based on the health information ($n = 235$).

Characteristic	*n*	%
BMI (*Min–Max* = 14–36)		
<19 kg/m^2 (Underweight)	47	20.00
20–23 kg/m^2 (Normal)	141	60.00
24–25 kg/m^2 (Overweight)	38	16.17
≥26 kg/m^2(Obese)	9	3.83
Total cholesterol :		
<11.1 mmol/L (Desirable)	117	49.78
11.1-13.2 mmol/L (Borderline)	71	30.22
≥ 11.1 mmol/L (High)	47	20.00
Regularly checking blood pressure		
Yes	104	44.26
No	131	55.74
Current blood pressure		
SBP (*Min–Max* = 110–220)	*M* = 147.38	*SD* = 18.39
DBP (*Min–Max* = 70–150)	*M* = 92.53	*SD* = 11.99
Duration		
0–1 year	109	46.38
2–3 years	116	49.37
4–5 years	10	4.25
Comorbidity		
Diabetes Mellitus	91	38.73
Hypertension	144	61.27

5.1. Demographic data and health information

The majority of participants with IHD were more than 50 years and the most of them were male. These data was supported by Ardebili., et al. [26], who reported that the age of the persons with IHD are typically more than 50 years and that most of them are males in Iran. Regarding the marital status and religion, the majority of the participants were married and Muslim. These findings were similar to those obtained by a previous study done in Indonesia by Pravitasari [3].

Furthermore, all the participants in this study had been diagnosed with IHD for less than 5 years and the majority of them had hypertension. These findings are similar to those of the previous study conducted in Malaysia which reported that hypertension was the main comorbidity condition in patients with IHD [27].

Table 3
Minimum, maximum, mean, standard deviation and level of illness perception ($n = 235$).

Variable	Dimensions	Min	Max	Mean	*SD*	Level
Illness perception	Total score	33	52	46.65	3.93	Moderate
	Consequences	5	10	7.68	1.45	High
	Concern	1	7	7.38	1.62	High
	Treatment control	3	9	6.26	0.87	Moderate
	Timeline	3	10	6.21	2.23	Moderate
	Identity	2	7	4.39	0.98	Moderate
	Emotion	2	7	4.27	0.96	Moderate
	Personal control	1	7	3.76	1.48	Low
	Coherence	4	10	3.70	1.56	Low

Table 4
Causes of IHD perceived by persons with IHD.

Causes	*n*	%
Smoking	112	47.66
Diet	52	22.12
Stress	34	14.46
Physical inactivity	24	10.22
Hypertension	7	2.97
Diabetes mellitus	4	1.71
Heredity	2	0.86

Table 5
Minimum, maximum, mean, standard deviation and level of cardiovascular health behaviour ($n = 235$).

Variable	Dimensions	Min	Max	Mean	*SD*	Level
Cardiovascular health behaviour	Total score	68	80	80.29	5.42	High
	Diet management	24	32	28.66	2.21	High
	Physical activity	13	16	15.13	0.95	High
	Smoking cessation	8	12	10.67	1.12	High
	Taking medications	5	12	10.43	1.67	High
	Stress management	5	16	9.17	2.74	Moderate
	Blood pressure control	4	12	6.23	2.11	Moderate

Table 6
Correlations between illness perception and cardiovascular health behaviour in each variables(*r*,*P*).

Variable	Cardiovascular Health Behaviors						
Illness Perception	Smoking cessation	Diet management	Blood pressure control	Physical activity	Stress management	Taking medication	Total score
Consequences	0.359**	0.238**	0.107	0.067	0.250**	0.196**	0.412**
	0.000	0.000	0.103	0.310	0.310	0.003	0.000
Timeline	0.419**	0.224**	0.119	0.090	0.220**	0.229**	0.220**
	0.000	0.001	0.069	0.171	0.001	0.000	0.000
Personal control	0.264**	0.188**	0.000	0.126	0.117	0.238**	0.286**
	0.000	0.004	0.998	0.054	0.740	0.000	0.000
Treatment control	0.216**	0.073	0.121	0.123	0.182**	0.089	0.263**
	0.001	0.265	0.063	0.061	0.05	0.173	0.000
Identity	0.251	0.174**	0.091	0.066	0.217**	0.126	0.319**
	0.000	0.008	0.163	0.316	0.001	0.053	0.000
Concern	0.367**	0.184**	0.179**	0.051	0.293**	0.188**	0.437**
	0.000	0.005	0.006	0.433	0.000	0.004	0.000
Coherence	0.411**	0.217**	0.140*	0.051	0.233**	0.198**	0.416**
	0.000	0.001	0.032	0.433	0.000	0.002	0.000
Emotion	0.300**	0.146*	0.050	0.046	0.173**	0.172**	0.290**
	0.000	0.025	0.447	0.478	0.008	0.008	0.000

Note: ** Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed).

5.2. Level of illness perception

The level of total illness perception among persons with IHD is at moderate. The result indicating a moderate threatening view of illness perception. It might be because persons received knowledge from doctors and nurses about IHD and ways to control of IHD in the future. Clinical trials had shown that illness beliefs in persons with IHD had been changed during first-time IHD attack [12]. From the OEQ, persons perceived changes in their lives soon after being diagnosed, however, persons with IHD needed more time and support from health care provider and family members to adapt with their illness.

Regarding consequences from IHD, persons with IHD perceived consequences of the illness at a high level. Most of the persons experienced severe chest pain and discomfort while having a heart attack. This typical symptom of IHD affected their lives.

Persons with IHD perceived high concern towards their illness, but most of them were concerned about financial problem and the impact of the illness on their families. Further, in this study, the persons realized that they could not perform their duty, which would cause problems for their family. For instance, family members had to devoted time, effort, and money to care for them, when they had self-care limitation.

Regarding treatment control, persons with IHD perceived that treatment could control the illness at a moderate level. However, personal control is perceived at a low level of illness perception, because most of the Muslim persons thought that God had a major influences of their illness. Similarly, with a study conducted by Dias., et al. [28], who found that more than 50% patients did not adhere to treatment, because some persons with IHD tried to take medications but lacked effort in terms of undergoing behavioural changes.

Persons with IHD reported timeline, which is the perception of illness duration at a moderate level because the persons perceived ischemic heart disease as a chronic illness that need long-term treatment.

Identity is reported at a moderate level, indicating the perception of moderate severe symptoms. The main identities of IHD are chest pain, breathlessness, and fatigue [29]. The severe symptoms disappear after taking medication regularly.

Emotion was also reported at a moderate level, indicating a moderate-level of anxiety, worry or depression, worrying about the future, feeling punished by God, and feeling hesitant to depend on family members. Similarly, Devcich et al. [30] found that persons emotionally respond to change after having IHD.

Coherence, the understanding of illness, was perceived by a person with IHD at a low level because he or she believed the illness was caused by God, and the thought that the illness was caused by God was common and some persons with IHD expressed low-level coherence.

In this study, persons perceived several causes of IHD. The three most perceived causes of IHD are the following: 1), smoking, 2) unhealthy diet and, 3) stress. Some causes are similar to those of the study conducted by Reges et al. [31] who mentioned that the possible causes of acute myocardial infarction are stress, smoking, and heredity.

5.3. Level of cardiovascular health behaviour

In this study, the level of cardiovascular health behaviour is high, Thereby indicating a high performance of the cardiovascular health behaviour. The high level of cardiovascular health behaviour might be due to the fact that persons with IHD receive advice from doctors and nurses upon admission to the hospital. They possibly did not

want their health condition to deteriorate. Thus, they might have tried to perform good cardiovascular health behaviour.

Persons with IHD in this study could perform good cardiovascular health behaviour especially in terms of diet management, physical activity, smoking cessation, and taking medications, not only because health care personnel tried to motivate them to change their unhealthy behaviour since the first diagnosis of IHD, but also because they receive support from their family members and friends, especially in maintaining a healthy diet, being reminded to engage in physical activities, stopping smoking, and being reminded to take medications regularly. This finding was supported by Murray et al. [32] who reported that support from family and friends, beliefs about the causes of illness and lifestyle change are main factors associated with uptake and completion of cardiovascular lifestyle behaviour change. For smoking cessation, from a religious perspective, smoking is forbidden for all Muslim. In addition, persons with IHD realized that smoking would have an impact on the progression of IHD, so they tried to stop smoking.

Stress management and blood pressure control of the persons with IHD are at a moderate level. For stress management, the result was similar with a previous study done by Schneider et al. [33], who reported that stress management in persons with IHD was moderate due to having a positive attitude in improving cardiovascular health behaviour especially stress management in persons with IHD. Another factor that increased level of stress management was social support such as having a good relationship with family members, religious groups and community [32]. For blood pressure control, persons with IHD need to go to the health care office for blood pressure check-up, so they could not check their blood pressure more often.

5.4. Relationship between illness perception and cardiovascular health behaviour

The results of the current study revealed a positive correlation between illness perception and cardiovascular health behaviour among persons with IHD with a significant level of 0.01, indicating that the higher appropriate illness perception contributes to the higher appropriate cardiovascular health behaviour. This finding is consistent with that of some previous studies. Foxwell, Morley, and Frizelle [34] stated that illness perception is related to behaviour outcomes. Moreover, Janssen, De Gucht, van Exel, and Maes [12] found that illness perception increased during long-term treatment, and that these changes are associated with better health behaviour.

The present study has several reasons that support the relationship between illness perception and cardiovascular health behaviour. The first reason is related to culture. In Indonesia especially in Bondowoso City, the primary social unit is the extended family and there are strong familial relationships among the members of family [3]. Therefore, a strong sense of family and community support might influence illness perception, which means persons may perform cardiovascular health behaviour regularly and keep away from unhealthy behaviour; such as unhealthy diet, and smoking cessation. Strong bonds with family and a healthy life style might also influence the persons to perform cardiovascular health behaviour [35].

Secondly, the majority of the persons are Muslim. For Muslims alcohol drinking is prohibited. The law of Indonesia prohibits alcohol drinking and smoking in the open. Similarly, the previous study revealed a positive relationship between culture and cardiovascular health behaviour in persons with IHD [36]. Besides the Muslim religion, family members contributed to fostering a good relationship between illness perception and cardiovascular health behaviour in persons with IHD. The wife, husband, or children usually heart-healthy food for persons with IHD. They also advised persons to stop smoking and drinking alcohol and to practice healthy behaviour, similar with that of Clark et al. [37] who supported that the family member motivates and encourages the persons to join health checkups and to stop smoking, manage their diet, control their pressure, do physical activity, manage their stress, and take medication. Family member's decisions and their advice have a significant impact on the person's perception to perform cardiovascular health behaviour. The persons also enjoy being in touch with family members, and peers, because their thinking, beliefs, identities, and evaluations with regards to healthy behaviour are similar [34].

Thirdly, a positive relationship existed between cardiovascular health behaviour and illness perception because of the good relationship between health care provider and persons with IHD. Most persons are aware of their health after being diagnosed with the IHD and needed more time to understand their illness. Building a healthier future is a partnership between a person and doctors, nurses, pharmacists and other healthcare providers who can help the person change their health behaviour [38]. Improvement of cardiovascular health behaviour in persons with IHD could be achieved through consistent care and by providing the needs of persons with IHD wanted and listening to what they say during the treatment [39]. These are the major role of nurses.

This study, the CSM, helped describe the illness perception, which is the perception of identity, time, consequences, and causes of disease. The differences in perception of illness could have an effect on the differences in the cardiovascular health behaviour of each person, which influences the chances of taking control of their health conditions. The CSM helps persons develop an understanding of their illness by formulating their own ideas about the illness perception. The understanding of illness is based on a person's experience and practice. This understanding creates a person's illness perception that influences the behaviour, which can then be applied to improve cardiovascular health behaviour.

5.5. Strengths and limitations

The strength of this study is its use of total sampling technique in participant recruitment. Despite its strength, the findings of the study cannot be generalised because it was carried out only in a sub-district setting.

5.6. Implications of the study

5.6.1. Understanding the relationship between illness perception and cardiovascular health behaviour can help the nurses design an effective intervention program for promoting positive perception about IHD

The Community health nurses can apply the illness perception concept in public health care to address cardiovascular health behaviour in the community. They can promote smoking cessation, diet management, blood pressure control, physical activity, stress management and taking of medications to persons with IHD.

5.6.2. The nurses should be concerned and should arrange the appropriate interventions for the persons with IHD in the community setting, such as an educational program for enhancing illness perception and better performance of cardiovascular health behaviour

They should run specific interventions to support persons with IHD who have low personal control or low concern about illness, in order to promote better cardiovascular health behaviour.

6. Conclusion

The results of the current study revealed a positive correlation between illness perception and cardiovascular health behaviour among persons with IHD with a significant level of 0.01, thereby indicating that the higher appropriate illness perception contributed the higher appropriate cardiovascular health behaviour and that persons with a higher illness perception had a positive correlation with higher cardiovascular health behaviour. The findings of this study have several important implications for the nursing practice. A community health nurse can help persons gain more appropriate illness perception on IHD and develop constant cardiovascular health behaviour, especially smoking cessation, physical activity, eating healthy food, controlling blood pressure, stress management and taking medication.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ijnss.2018.04.007.

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